

**CHAPTER 2. PART 29  
AIRWORTHINESS STANDARDS  
TRANSPORT CATEGORY ROTORCRAFT**

**SUBPART A - GENERAL**

AC 29.1.    § 29.1 (Amendment 29-21) APPLICABILITY.

a. Explanation. This section prescribes the rotorcraft categories eligible for certification under this part. There is no minimum weight limit for certification under Part 29; however, Part 27 is applicable to rotorcraft with maximum weights of 6,000 pounds or less so that Part 29, in effect, deals with rotorcraft which have a maximum weight greater than 6,000 pounds. In Part 29, there are two categories of rotorcraft, Category A and Category B.

(1) Category A. Category A provides the most rigid rules, requiring multiengine design with independent engines, fuel systems, and electrical systems. Category A design requires that no single failure can cause loss of more than one engine. Although there is no limit on maximum weight, Category A rotorcraft are certificated at a weight which will assure a minimum climb capability in the event of engine failure and with adequate surface area to assure a safe landing in the event an engine fails early in the takeoff run.

(2) Category B. Category B rotorcraft may be single or multiengine and may not have a maximum weight greater than 20,000 pounds. Category B rotorcraft are not required to have the capability for continued flight with an engine failed.

(i) Without Engine Isolation. For single engine rotorcraft and multiengine rotorcraft without engine isolation, the height-velocity diagram is conducted with sudden failure of all engines and the takeoff distance is measured through the clear area of the diagram to the 50-foot point with all engines operating. The landing distance is determined with all engines inoperative.

(ii) With Engine Isolation. Category B multiengine rotorcraft may be certificated with the Category A design features of Part 29. These rotorcraft meet the design requirements of Category A, but the performance requirements of Category B. Stay-up ability after an engine failure is not assured. The takeoff is conducted with all engines operating, while the height velocity diagram and landing distances are determined with the most critical engine inoperative.

(3) Dual Certification, Categories A and B. A multiengine rotorcraft may be certificated under both categories provided requirements for both categories are met. This combination will typically result in conditions (1) and (2)(ii) above with the primary differences being the gross weight allowed and the surface areas required for takeoff.

b. Procedures. None.

AC 29.1A. § 29.1 (Amendment 29-39) APPLICABILITY.

a. Explanation. Amendment 29-39 revised the reference in § 29.1(e) from §§ 29.79 to 29.87, which is a redesignation of the section number for the height-velocity envelope. This section prescribes the rotorcraft categories eligible for certification under this part. There is no minimum weight limit for certification under Part 29; however, Part 27 is applicable to rotorcraft with maximum weights of 6,000 pounds or less so that Part 29, in effect, deals with rotorcraft which have a maximum weight greater than 6,000 pounds. In Part 29, there are two categories of rotorcraft. Category A and Category B.

(1) Category A. Category A provides the most rigid rules, requiring multiengine design with independent engines, fuel systems, and electrical systems. Category A design requires that no single failure can cause loss of more than one engine. Although there is no limit on maximum weight, Category A rotorcraft are certificated at a weight which will assure a minimum climb capability in the event of engine failure and with adequate surface area to assure a safe landing in the event an engine fails anywhere in the flight envelope, including takeoff or landing operations.

(2) Category B. Category B rotorcraft may be single or multiengine and may not have a maximum weight greater than 20,000 pounds. Category B rotorcraft are not required to have the capability for continued flight with one engine inoperative.

(i) Without Engine Isolation. For single engine rotorcraft and multiengine rotorcraft without engine isolation, the height-velocity diagram is conducted with sudden failure of all engines and the takeoff and landing distances are measured with all engines operating.

(ii) With Engine Isolation. Category B multiengine rotorcraft may be certificated with the Category A design features of Part 29. These rotorcraft meet the design requirements of Category A but the performance requirements of Category B. Stay-up ability after an engine failure is not assured. The takeoff distance is determined with all engines operating. The landing distance, at the option of the applicant, may be determined with the critical engine inoperative or with all engines operating. The height-velocity diagram is determined following failure of the most critical engine.

(3) Dual Certification, Categories A and B. A multiengine rotorcraft may be certificated under both categories provided requirements for both categories are met. This combination will typically result in conditions (1) and (2)(ii) above with the primary differences being the gross weight allowed and the surface areas required for takeoff.

b. Procedures. The guidance material in paragraph AC 29.1 does not apply to rotorcraft certified with Amendment 29-39 or later.

AC 29.2. § 29.2 (Amendment 29-32) SPECIAL RETROACTIVE REQUIREMENTS.a. Explanation.

(1) Amendment 29-32 requires a combined shoulder harness and safety belt (also called a torso restraint system) at each occupant's seat for all rotorcraft manufactured after September 16, 1992.

(2) The design features of the restraint system are mainly contained in this section rather than having to refer to other sections within Part 29 except for a general reference to the differing strength standards between earlier static strength only standards and the static and dynamic strength standards of Amendment 29-29.

(3) Combined safety belt and harness strength standards system follows:

(i) Those rotorcraft type designs certificated to static strength standards alone prior to Amendment 29-29, such as 4 g's forward may use belt and harness systems, characterized as 1,500 pounds strength systems, provided they comply with those standards. TSO C22f and earlier restraint systems have such ratings. A combined belt and harness with a 1,500 pounds rating, which comply with the Part 29 standards for the rotorcraft type design, but are not necessarily TSO approved, may be approved as a part of the type design. Such design information for a non-TSO'd item would be included in a note on the aircraft type certificate data sheet (TCDS) or specification sheet by part number as "required equipment." TSO C114-approved torso restraint systems, characterized as 3,000 pounds strength system, may be used provided the design features comply with this section, but no special information on the TCDS is necessary.

(ii) Those rotorcraft type designs certified to dynamic test requirements of Amendment 29-29 should use torso restraint systems approved under TSO C114 or approved under equivalent standards such as those contained in Part 29.

(4) Load Distribution and Design Requirements. Although not stated in § 29.2, a 60 percent and 40 percent load distribution between the safety belt and harness, respectively, is required in § 29.785(g). The safety belt should withstand 100 percent if the safety belt is capable of being used alone. Also, the safety belt or harness attachments to the seat or structure should include the 1.33 factor described in § 29.785(f)(2) of Amendment 29-24 for those rotorcraft with that certification criteria or should include the 1.15 factor as described in § 29.625 (and predecessor § 7.355(c)(2) CAR Part 7) standards for those rotorcraft with the earlier certification criteria. A factor is used whether test results or analysis methods are used for static substantiation of the seating systems. Refer to paragraph AC 29.785b(1)(i) (§ 29.785).

(5) The companion operating rule change of Amendment 91-220, amended § 91.205 (Amendment 91-223), affecting the aircraft equipment requirements.

Operating rule § 91.107(a) already requires use of the harness whenever the aircraft seat is so equipped.

b. Procedures.

(1) A TSO-approved combined safety belt and harness or torso restraint system may be used provided the installation requirements in § 29.2 are satisfied. A combined belt and harness (not necessarily TSO approved) may be approved as a part of the rotorcraft type design and so noted on the aircraft specification or TCDS.

(2) Structural analysis or static test may be used. For those rotorcraft designs that are subject to the dynamic test standards of § 29.562, the torso restraint system is required to be qualified for the particular use or installation in each rotorcraft type design. A dynamic test may be required for alternate restraint systems as well as the originally approved system. TSO C114 approval does not constitute approval for installation of a restraint system in a rotorcraft design subject to dynamic tests.

(i) AC 20-137 dated March 30, 1992, concerns in part the dynamic test standards of Amendment 29-29.

(ii) AC 23-4 dated June 20, 1986, concerns static test procedures for small airplane seats and restraint systems. (Certain small airplanes manufactured after December 12, 1986, should have harnesses for each seat also.) A test proposal for rotorcraft installations may adopt procedures appropriate to the particular installation. The 60/40 percent distribution is sufficiently achieved when the blocks in Figure 4 of AC 23-4 are used.

(iii) The static design side load for the harness installation may be proven by test or analysis using the load distribution previously noted. For "older" designs, the side load of § 29.561(b)(3)(iii) is 2.0g, and for later designs (Amendment 29-29 and later), it is 8.0g.